

Manitoba Hydro Seven Sisters Generating Station Licence Implementation Guide for Water Levels

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Executive Summary

Introduction

Manitoba Hydro prepared this guide to document a common understanding of compliance with the water regime terms of the Seven Sisters Water Power Act Licence. This document sets out the mutually understood and agreed to:

- 1) Methodology to be used for determining critical water levels;
- 2) Definition of licence compliance; and
- 3) Protocol for reporting.

Seven Sisters Forebay Water Level

The **Seven Sisters Forebay Water Level** is directly measured at the beginning of each hour at the generating station.

Compliance

Compliance with the Seven Sisters Water Power Act Licence will be measured against the **Seven Sisters Forebay Water Level**.

Reporting

In the event that the **Seven Sisters Forebay Water Level** is not in compliance with the licence limit, Manitoba Hydro will notify Manitoba Sustainable Development within one week of the incident. A follow-up report on causes contributing to the event and changes to operations, if any are needed to prevent such an event in the future, will be provided to Manitoba Sustainable Development. A record of water levels and licence compliance will also be provided in an annual report.

Change Management

Proposed revisions to this guide will be drafted by Manitoba Hydro as required or directed by Manitoba Sustainable Development. Following review and approval of revisions by Manitoba Sustainable Development, a revised copy of this guide will be produced and distributed by Manitoba Hydro.

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1. Introduction

Seven Sisters Generating Station is located approximately 90 km northeast of the City of Winnipeg and approximately 72 km upstream of Lake Winnipeg.

The Seven Sisters Generating Station was constructed in two stages between 1929 and 1952 and has the greatest generation capacity of the Manitoba Hydro plants located on the Winnipeg River.

Manitoba Hydro currently operates the Seven Sisters Generating Station under a Second Short-Term Extension Licence (STEL) issued in accordance with the provisions of The Water Power Act on October 1, 2015. The STEL is in effect until September 30, 2020. The operating terms of the STEL are identical to those of the final licence issued on June 03, 1966. Seven Sisters Generating Station has a licenced capacity of 167.8 MW (225,000 horsepower).

1.1 Definitions

For the purposes of this guide, unless the context otherwise requires, the following terms shall have the respective meanings set out below and grammatical variations of such terms shall have corresponding meanings:

ASL means above sea level

Controlling Benchmark means Geological Survey of Canada (GS of C) benchmark 10K. Benchmark 10K is a shank in bedrock located 2 miles below Seven Sisters close to the edge of the right bank at the first prominent point below Seven Sisters.

Seven Sisters Gauge refers to a float attached to a steel tape that is draped over a pulley connected to a Selsyn (self-synchronous) system that measures the forebay water level.

Seven Sisters Forebay Water Level means the hourly water level as measured by the **Seven Sisters Gauge**.

1.2 Datum

In accordance with Article 4 of the Seven Sisters First Renewal Water Power Act Licence, water level information for the operation of the Seven Sisters Project is measured in terms of elevations **ASL**, **GS of C**, Canadian Government Vertical Datum (CGVD) 1928, 1929 Local Adjustment.

1.3 Quality Control

1.3.1 Benchmarks

Vertical control surveys have been performed to establish appropriate local benchmarks at the Seven Sisters Generating Station.

Seven Sisters benchmarks were established by level transfer from **Controlling Benchmarks** using spirit levelling methods.

1.3.2 Direct Water Level Measurements

Staff monitor the **Seven Sisters Gauge** equipment weekly and as required to maintain gauge performance. Direct water level measurements are taken during these checks and compared to the level indicated by the water level gauge. Direct water level measurements that differ by more than 0.1 feet are reported and repaired.

1.3.3 Gauge Readings

The forebay gauge consists of a float attached to a steel tape that is draped over a pulley connected to a Selsyn (self-synchronous) system. This system electronically transmits the angular position of the pulley to a receiving device in the control room. The position information is converted to a water level, indicated on a display and also output to the Remote Transmittal Unit for transmission to Manitoba Hydro's System Control Centre.

1.4 Quality Assurance Procedure for Water Level Data

Seven Sisters Plant Data

Data is collected on site and signed off by the operating supervisor. Data is then sent to the Energy Operations Planning & Technology Department of Manitoba Hydro, uploaded into a database and checked for errors. Data errors are then corrected or verified by plant operating staff with technical assistance from Energy Operations Planning & Technology staff as needed. Once data has been verified, it may be used for operations planning, studies, model development and reporting.

2. Seven Sisters Forebay Water Level

Article 4 of the Seven Sisters Water Power Act Licence places a limit on the **Seven Sisters Forebay Water Level**. A map showing the location of the **Seven Sisters Gauge** is provided in Appendix A. Water levels are largely influenced by the operation of the Seven Sisters Generating Station and local meteorological events. Due to the size of the forebay and location of the **Seven Sisters Gauge**, wind effects on the **Seven Sisters Forebay Water Level** are negligible.

Seven Sisters Forebay Water Level measurements are taken continuously and recorded at the beginning of each hour and reported to Manitoba Hydro's System Control Centre.

3. Compliance

3.1 Seven Sisters Water Power Act Licensing Requirement

Maximum Water Level

Article 4 of the licence stipulates that:

“The Licensee shall not raise the headwater of the development to an elevation higher than 899.5 above mean sea level, Canadian Geodetic Datum 1929 Adjustment, provided, however, that with the consent of the Licensee of the next development upstream, namely, Slave Falls Generating Station, and with the prior written approval of the Director, the Licensee may raise and maintain the headwater elevation in accordance with Section 72 of the Regulations.”

The forebay water level shall be in compliance with the limit described above if the hourly

Seven Sisters Forebay Water Level:

- a) does not exceed 899.5 feet by more than 0.1 feet; and
- b) does not exceed 899.5 feet more than two times or for more than two consecutive hours in any 24-hour period.

Based on the accuracy and location of the **Seven Sisters Gauge**, Manitoba Hydro defines instances where the licence limit is exceeded by 0.1 feet as reportable events.

3.2 Reporting

3.2.1 Compliance Reporting

In the event that the **Seven Sisters Forebay Water Level** is not in compliance with the licence limit as described in Section 3.1, notification shall be made to Manitoba Sustainable Development within one week of the incident. A follow-up report on causes contributing to the event and changes to operations, if any are required to prevent such an event in the future, will be provided to Manitoba Sustainable Development.

3.2.2 Maintenance and Emergencies

During maintenance and emergencies there may be times when Manitoba Hydro is required to deviate from a licence condition for safety or other purposes. Manitoba Hydro will be considered compliant with the licence as long as:

1. Advanced notification is provided to Manitoba Sustainable Development of the upcoming licence deviation together with the reason. This will include a description of the operating plan, details of the expected licence deviation, a summary of anticipated impacts to stakeholders, and confirmation that stakeholders will also be notified; and

2. Advanced notification is provided to stakeholders of pertinent impacts to flow and water levels; and
3. Following the deviation, notification by letter is provided to Manitoba Sustainable Development on the details of the operation(s).

3.2.3 Regular Annual Reporting

Water levels and licence compliance will be reported annually to Manitoba Sustainable Development.

4. Change Management

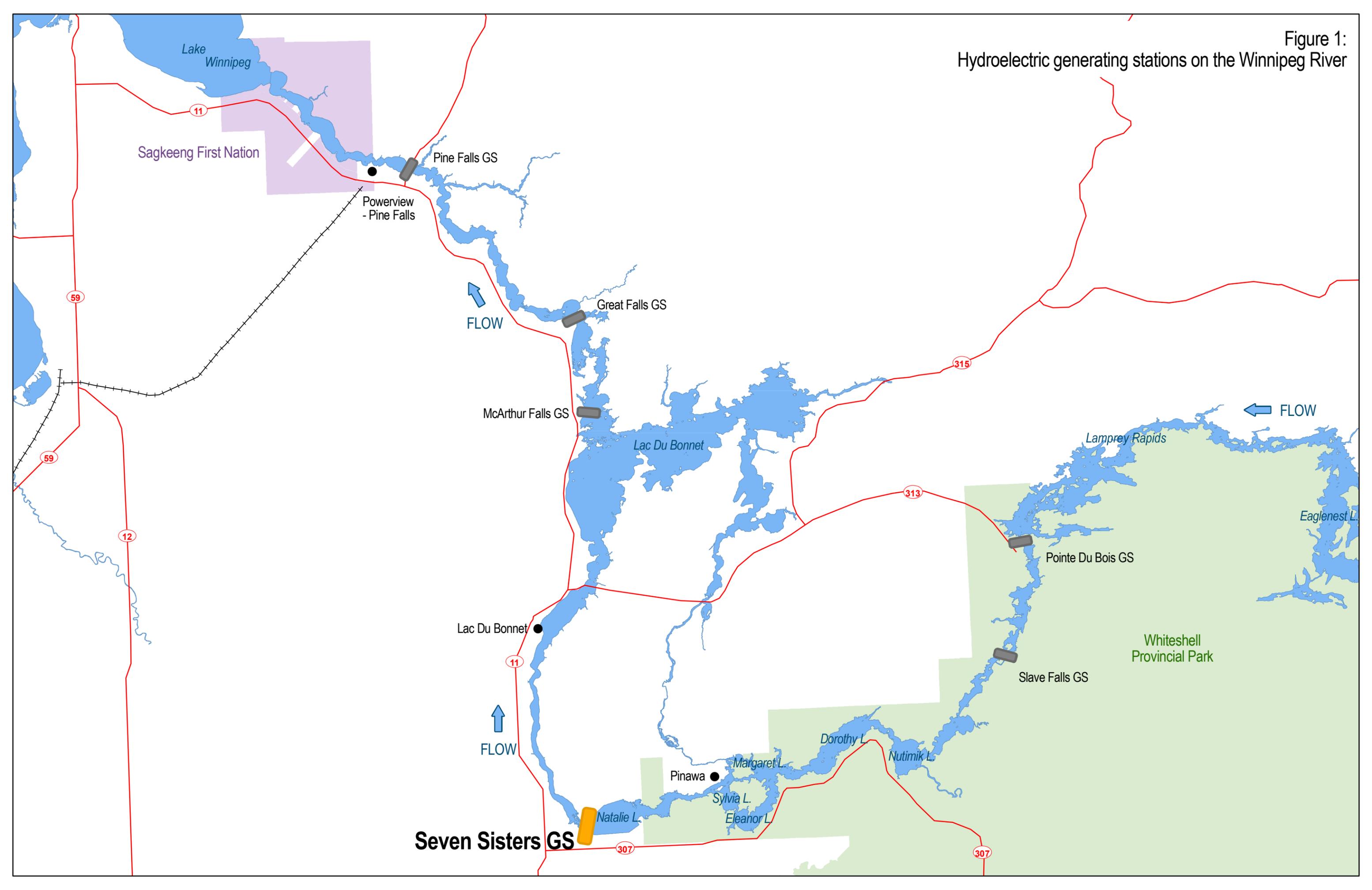
4.1 Regular Updates

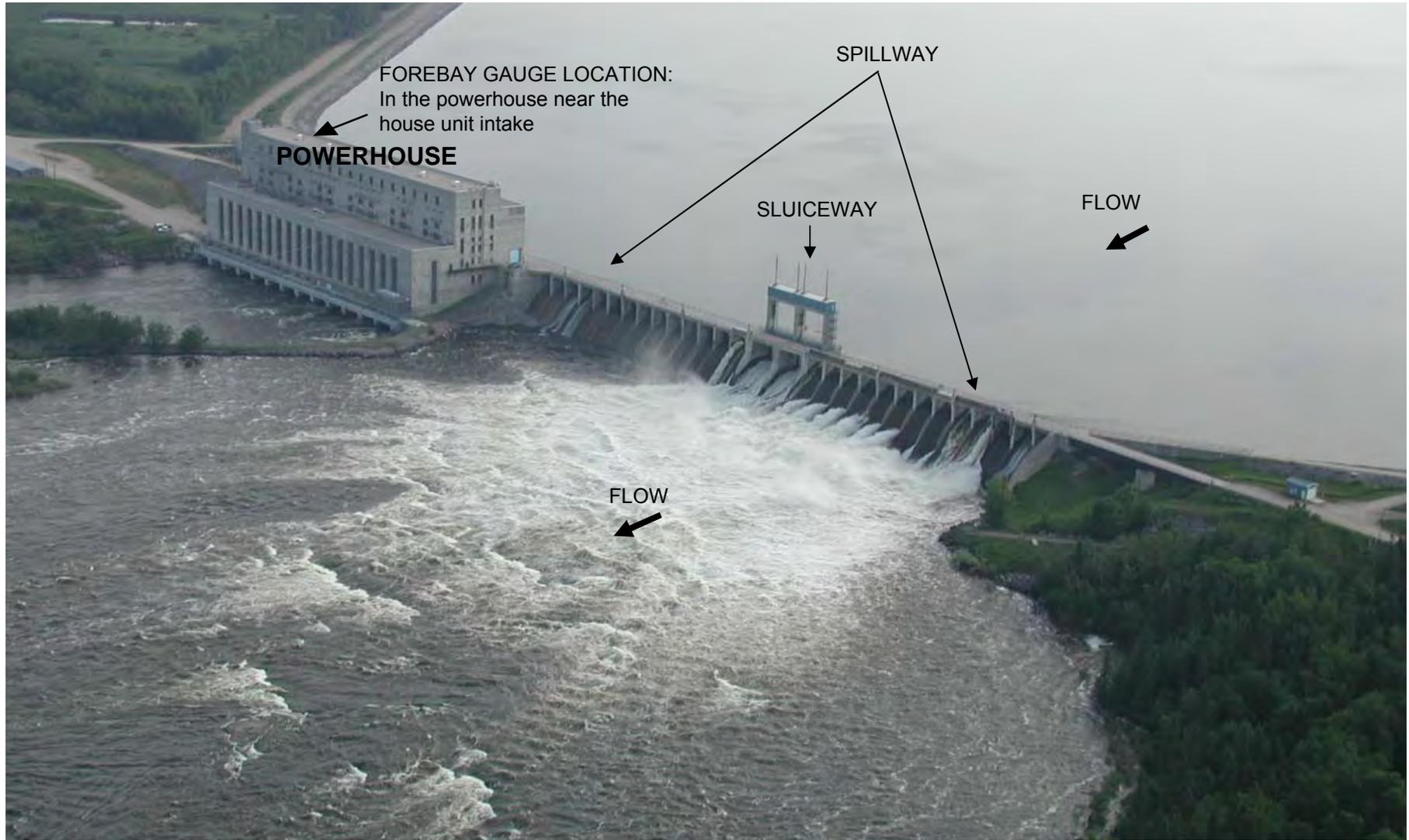
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Appendix A

Forebay Water Level Gauge Location

Figure 1:
Hydroelectric generating stations on the Winnipeg River





	MANITOBA HYDRO	
	HYDRAULIC OPERATIONS DEPARTMENT	
	SEVEN SISTERS GENERATING STATION	
DRAWN BY PGC	FOREBAY WATER LEVEL GAUGE LOCATION	
YEAR 2017	PROJECT LICENCE IMPLEMENTATION GUIDE	FIGURE 2